

WHAT IS CLAIMED IS:

- 1           1.     A method of making bone particles which comprises:
  - 2           a)     at least partially immersing a quantity of bone in an immobilization
  - 3     medium;
  - 4           b)     solidifying the immersed bone and its immobilization medium to provide a
  - 5     solidified mass of bone and immobilization medium; and,
  - 6           c)     subdividing the solidified mass of bone and immobilization medium to
  - 7     provide subdivided particles of bone.
- 1           2.     The method of Claim 1, wherein the subdivided bone particles are in
- 2     association with immobilization medium.
- 1           3.     The method of Claim 1 further comprising the step of separating the bone
- 2     particles from its immobilization medium.
- 1           4.     The method of Claim 1 wherein the immobilization medium is sufficiently
- 2     rigid to anchor itself and the bone contained therein against the forces applied during a
- 3     milling operation.
- 1           5.     The method of Claim 1 wherein the immobilization medium is selected
- 2     from the group consisting of water, water based acid solutions, water based basic
- 3     solutions, water based salt solutions, water based polymer solutions, organic liquids,
- 4     carbon dioxide, solutions of polymers, materials that are liquid below about 80° C and can

5 be solidified by cooling, materials that solidify through chemical action, materials that  
6 solidify upon removal of a solvent, and materials that crystallize to form solids.

1 6. The method of Claim 1 wherein the immobilization medium is selected  
2 from the group consisting of glycerol, propylene glycol, polyethylene glycol, ethanol,  
3 hydrochloric acid, peracetic acid, polystyrene, and polyvinyl chloride.

1 7. The method of Claim 1 wherein the immobilization medium is a  
2 composition which sublimates.

1 8. Bone particles produced in accordance with the methods of Claim 1.

1 9. The bone particles of Claim 8 wherein the size of the particles ranges from  
2 about 150 microns<sup>3</sup> to about 14 cm<sup>3</sup>.

1 10. The method of Claim 1 wherein the starting bone material comprises more  
2 than one whole bone, a whole bone, and any fragments thereof.

1 11. The particles of Claim 8 wherein the ratio of bone to immobilization  
2 medium is from about 1:100 to about 10:1.

1 12. The bone particles of Claim 8 wherein the particles are fibers with varied  
2 orientations relative to the collagen fibrils of the donor bone.

1           13.    An implant made of bone particles produced in accordance with the  
2    methods of Claim 1.

1           14.    An implant made of bone particles produced in accordance with the  
2    methods of Claim 2.

1           15.    A composition comprising one or more bone fragments in combination  
2    with an immobilization medium.

1           16.    The composition of Claim 15 wherein the immobilization medium is  
2    sufficiently rigid to anchor itself and the bone contained therein against the forces applied  
3    during a milling operation.

1           17.    The composition of Claim 15 wherein the immobilization medium is  
2    selected from the group consisting of water, water based acid solutions, water based basic  
3    solutions, water based salt solutions, water based polymer solutions, organic liquids,  
4    solutions of polymers, materials that are liquid below about 80° C and can be solidified by  
5    cooling, materials that solidify through chemical action, materials that solidify upon  
6    removal of a solvent, and materials that crystallize to form solids.

1           18.    An apparatus for forming a solidified mass of bone and immobilization  
2    medium for subsequent subdivision into particles, which comprises:

3           a)       a base;

- 4           b)           a base frame attached to the surface of the base; and,  
5           c)           a detachable former member enclosing the base frame.

1           19.    A workpiece holder which comprises:

- 2           a)           a base; and,  
3           b)           a base frame attached to the surface of the base.

1           20.    The workpiece holder of Claim 19 wherein the base possesses a  
2    passageway for the circulation of refrigerant therethrough.

1           21.    The workpiece holder of Claim 19 wherein the refrigerant is selected from  
2    the group consisting of water, aqueous solutions, water/organic mixtures, water/alcohol  
3    mixtures, organic liquids, fluorocarbon refrigerants, chloro-fluorocarbon refrigerants,  
4    ammonia, propylene glycol/water solutions, ethylene glycol/water solutions, brine  
5    solutions, alcohol solutions, liquefied gasses, liquid nitrogen, and cooled gasses.

1           22.    The workpiece holder of Claim 19 wherein the base comprises a  
2    thermoelectric device to regulate the temperature.

1           23.    The workpiece holder of Claim 19 wherein the workpiece holder holds a  
2    workpiece comprising a solidified mass of bone and immobilization medium and where  
3    cooling of the workpiece holder is accomplished by packing a solid refrigerant such as dry  
4    ice, a phase-change material such as calcium chloride, or a cooled liquid refrigerant in a  
5    container around the workpiece or its base.